*Original Article*

# Exploring the publications in three major orthodontic journals

## *A comparative analysis of two 5-year periods*

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**ABSTRACT**

**Objective:** To analyze the types of articles and authorship characteristics of three orthodontic journals—*American Journal of Orthodontics and Dentofacial Orthopedics* (AJODO), *The Angle Orthodontist* (AO), and *European Journal of Orthodontics* (EJO)—published between 2008 and 2012 and to assess the differences in content within this period and an earlier period of 1998 to 2002.

**Materials and Methods:** Each journal's content was accessed through the web edition. From each article, the following parameters were recorded: article type, number of authors, number of affiliations, source of article (referring to the first author's affiliation), and geographic origin. Descriptive statistics were performed and selected parameters were analyzed with the Pearson chi-square or Fisher exact test for independence at the .05 level of significance.

**Results:** Review of differences between the two periods showed that the number of publications was almost double. The percentages of multi-authored articles increased. Fewer studies derived from the United States/Canada and European Union countries. Increases for articles from non–European Union countries, Asia, and other countries were found. Characteristics of the second period showed that the EJO and AO published more research articles, whereas the AJODO regularly published case reports and other articles. Approximately 75% of all studies derived from orthodontic departments.

**Conclusions:** The publications from 1998–2002 and 2008–2012 were significantly different both in terms of numbers and characteristics. Within 2008–2012 there were notable differences between the three journals concerning the type and origin of the publications. (*Angle Orthod.* 2014;84:397–403.)

**KEY WORDS:** Orthodontic journals; Article characteristics; Bibliometrics

## INTRODUCTION

In recent years, advances in applications, techniques, and procedures have resulted in a notable increase in orthodontic research. One of the main purposes of scientific articles in orthodontics is to evaluate interventions and reach valid conclusions about recommended treatment modalities. With the number of orthodontic journals worldwide rising, implying a growing interest in the broader orthodontic research, the characteristics of the publications may reveal current trends, eg, authorship demographics, constituent components of affiliation, origin, basic or applied research, and other variables.[1] From another perspective, in light of increasing interest in evidence-based orthodontics, the availability of high-quality evidence is an import factor.[2,3]

In the past decade, orthodontic literature has evolved to include more high-hierarchy evidence. There has been an increase in basic research studies, and multi-faceted aspects of orthodontic topics such as biomechanics have been treated from the engineering and clinical perspective. The establishment of complex research methods and advanced methodologic approaches has been possible through the interaction of clinicians with scientists of a wide array of disciplines

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**Table 1.** Orthodontic Journals with Their Impact Factor from 2008 to 2012 According to *Journal Citation Reports*®, Thomson Reuters (2012)

| | Impact Factor | | | | |
|---|---|---|---|---|---|
| | 2008 | 2009 | 2010 | 2011 | 2012 |
| Journals included in the study | | | | | |
| *American Journal of Orthodontics and Dentofacial Orthopedics* | 1.442 | 1.327 | 1.354 | 1.381 | 1.458 |
| *The Angle Orthodontist* | 1.166 | 0.937 | 1.000 | 1.207 | 1.184 |
| *European Journal of Orthodontics* | 1.015 | 0.975 | 0.932 | 0.893 | 1.078 |
| Journals not included in the study | | | | | |
| *Orthodontics & Craniofacial Research* | | 1.607 | 1.809 | 1.652 | 1.186 |
| *Journal of Orofacial Orthopedics* | | 0.890 | 0.500 | 0.859 | 0.694 |
| *Korean Journal of Orthodontics* | | | 0.824 | 0.662 | 0.537 |
| *Australian Orthodontic Journal* | | | 0.444 | 0.250 | 0.281 |

including biology, biochemistry, engineering, physics, as well as epidemiology. This joint approach has been fruitful in the sense that high-caliber research on orthodontic topics is now being published in major biomedical periodicals. However, the main body of orthodontic literature accessible to orthodontic practitioners continues to be confined within the orthodontic journals.[4]

A study[5] investigating orthodontic journals during two intervals of 5 years each (1993–1997 and 1998–2002) attracted the authors' interest as a follow-up study after 10 years of the second interval (1998–2002) seemed reasonable. This follow-up study should depict the evolution of the orthodontic literature in the last 10 years. Therefore, the aim of this study was to analyze the types of articles and their authorship characteristics in three orthodontic journals—*American Journal of Orthodontics and Dentofacial Orthopedics* (AJODO), *The Angle Orthodontist* (AO), and *European Journal of Orthodontics* (EJO)—during an interval of 5 years (2008–2012) and to assess the changes in their contents from an earlier period (1998–2002), which had been published previously.[5] Furthermore, differences within the second interval (2008–2012) were to be evaluated.

## MATERIALS AND METHODS

To establish a set of comparable data, the method adopted by Kanavakis et al.[5] was followed, and the same three journals (AJODO, AO, and EJO) were included in this follow-up, though nowadays there are other orthodontic journals with impact factors (Table 1).

Each journal's issue was assessed by the online web edition by the first author and the following parameters were recorded:

(1) Article type: four categories were identified: research (article that included measurements and analysis of data), review (no actual experiment), case report, and other (not classifiable under the previous categories).
(2) Number of authors: the papers were classified as having one author or many authors.
(3) Number of affiliations: affiliations were classified as the author(s) having one affiliation or more. This variable represents the total number of affiliations in the article. This could be higher than the sum of authors because many authors have more than one affiliation.
(4) Source of article (referring to the first author's affiliation): the sources included orthodontic (research performed in orthodontic departments), nonorthodontic (research performed in other teaching institutions), and nonacademic (research performed in private practices, private-sector organizations, or research centers).
(5) Geographic origin of article: the origins were grouped as shown in Table 2.

The results were first analyzed by descriptive statistics. Secondly, the examination of association of the parameters ''type of article,'' ''main affiliation,'' and ''origin'' across the two time intervals was performed with the Pearson chi-square test or Fisher exact test for independence at the .05 level of significance. For all others parameters between the two intervals and within the second interval, only descriptive statistics will be given as the results of the Pearson chi-square test are not meaningful. STATA 12.1 statistical software package was used (StataCorp, College Station, Tex).

## RESULTS

The results of the analyses are shown in Tables 3 through 5. In the second interval, publications almost doubled compared to the first (1615 vs 2892). The first authors originated from 70 countries (Table 2). In Table 3, the top 10 publishing countries between 2008 and 2012 are listed. Almost one quarter of the publications derived from the United States, followed by Brazil, Japan, Turkey, and South Korea.

**Table 2.** Geographic Origins of Articles

| Code[a] | Country |
|---|---|
| 3 | Albania |
| 5 | Argentina |
| 4 | Australia |
| 2 | Austria |
| 2 | Belgium |
| 5 | Brazil |
| 5 | Brunei |
| 1 | Canada |
| 5 | Chile |
| 4 | China |
| 5 | Colombia |
| 5 | Costa Rica |
| 3 | Croatia |
| 2 | Czech Republic |
| 2 | Denmark |
| 5 | Egypt |
| 2 | Finland |
| 2 | France |
| 2 | Germany |
| 2 | Greece |
| 5 | Guam |
| 2 | Hungary |
| 3 | Iceland |
| 5 | India |
| 5 | Iran |
| 5 | Israel |
| 2 | Italy |
| 4 | Japan |
| 5 | Jordan |
| 5 | Kuwait |
| 2 | Latvia |
| 5 | Lebanon |
| 2 | Lithuania |
| 4 | Malaysia |
| 2 | Malta |
| 5 | Mexico |
| 5 | Morocco |
| 4 | Nepal |
| 2 | Netherlands |
| 4 | New Zealand |
| 5 | Nigeria |
| 2 | Norway |
| 5 | Pakistan |
| 5 | Palestine |
| 5 | Paraguay |
| 4 | Philippines |
| 2 | Poland |
| 2 | Portugal |
| 5 | Qatar |
| 2 | Romania |
| 3 | Russia |
| 5 | Saudi Arabia |
| 3 | Serbia |
| 4 | Singapore |
| 2 | Slovenia |
| 4 | South Korea |
| 2 | Spain |
| 5 | Sudan |
| 2 | Sweden |
| 2 | Switzerland |
| 4 | Taiwan |
| 5 | Thailand |
| 3 | Turkey |
| 5 | United Arab Emirates |
| 2 | United Kingdom |
| 1 | United States |
| 5 | Venezuela |
| 5 | West Indies |

[a] Codes: 1 indicates United States/Canada; 2, European Union countries plus Norway and Switzerland (European Union membership according to 2007 status); 3, non–European Union countries (European Union membership according to 2007 status); 4, Pacific/Oceania; and 5, other countries.

## Differences Between Periods 1998–2002 and 2008–2012

The publications with more than one author increased in all journals. The number of affiliations also increased in the AO, whereas it decreased in the AJODO and remarkably decreased in the EJO (Table 4).

*The Angle Orthodontist* published significantly more research articles, while the number of case reports and other articles decreased. Overall, there was no statistically significant difference for the type of articles. For all three journals, a statistically significant increase for articles from orthodontic departments was found. Fewer publications derived from nonacademic sources (eg, private practices).

Also, there was a considerable change in all journals concerning the origin of articles. Fewer studies derived from the United States/Canada and European Union countries. Increases of publications from non–European Union countries, from Pacific/Oceania, and from other countries were noticed (Figure 1).

## Differences Within the Period 2008–2012

The EJO published more research articles than the other two journals, but no case reports. Case reports and other articles were more frequently found in the AJODO. Almost three quarters of all studies derived from orthodontic departments. The EJO had more publications from nonorthodontic departments, where-

**Table 3.** Top 10 Publishing Countries Between 2008 and 2012

| | |
|---|---|
| United States | 24.72% |
| Brazil | 9.75% |
| Japan | 7.46% |
| Turkey | 7.40% |
| South Korea | 6.60% |
| Italy | 4.77% |
| United Kingdom | 4.53% |
| China | 3.91% |
| Germany | 3.91% |
| Canada | 2.66% |

**Table 4.** Number of Types of Article per Time Interval[a]

| | AO | | EJO | | AJODO | | Total | |
|---|---|---|---|---|---|---|---|---|
| | 1998–2002 | 2008–2012 | 1998–2002 | 2008–2012 | 1998–2002 | 2008–2012 | 1998–2002 | 2008–2012 |
| Number of publications | 405 | 857 | 318 | 542 | 892 | 1493 | 1615 | 2892 |
| | Share, % | Share, % | Share, % | Share, % | Share, % | Share, % | Share, % | Share, % |
| Number of authors | | | | | | | | |
| One | 21.67 | 6.88 | 4.73 | 2.89 | 24.49 | 14.40 | 18.87 | 9.92 |
| More | 78.33 | 93.12 | 95.27 | 97.61 | 75.51 | 85.60 | 80.13 | 90.08 |
| Number of affiliations | | | | | | | | |
| One | 34.42 | 26.49 | 5.05 | 26.70 | 26.53 | 32.22 | 37.05 | 30.05 |
| More | 65.58 | 73.51 | 94.95 | 70.30 | 73.47 | 67.78 | 79.07 | 69.95 |

[a] AO indicates *The Angle Orthodontist*; EJO, *European Journal of Orthodontics*; and AJODO, *American Journal of Orthodontics and Dentofacial Orthopedics*.

as the AJODO published more articles from nonacademic sources.

Approximately one third of the publications in the AJODO originated from the United States and Canada, whereas the EJO published almost no study from North America. More than half of the publications in the EJO derived from European Union countries. In the AO, publications from Pacific/Oceania and the United States/Canada contributed to one quarter each. Publications from non–European Union countries made up 20% in the AO, but only 4.5% in the AJODO.

## DISCUSSION

Bibliometrics allows researchers to explore the impact of a specific field. In a certain sense, it is a citation index that is accepted as a measurement of recognition, though it is not a measurement of quality or importance.[6] The approach to bibliometric analyses may be useful for information retrieval and stratification.[7] Several bibliometric studies in different fields of dentistry have been published, including pediatric dentistry,[8–11] endodontology,[12] periodontology,[13] implantology,[14,15] prosthodontics,[16,17] orofacial pain,[18]

**Table 5.** Number of Publications, Authors, and Affiliations per Time Interval[a]

| | AO | | | EJO | | | AJODO | | | Total | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Share, % 1998–2002 | Share, % 2008–2012 | Statistical Significance | Share, % 1998–2002 | Share, % 2008–2012 | Statistical Significance | Share, % 1998–2002 | Share, % 2008–2012 | Statistical Significance | Share, % 1998–2002 | Share, % 2008–2012 | Statistical Significance |
| Article type | | | | | | | | | | | | |
| Research | 69.46 | 86.35 | $P < .001$[b] | 98.52 | 98.15 | NS[c] | 69.73 | 68.52 | NS[b] | 79.42 | 77.41 | NS[b] |
| Review | 2.96 | 2.80 | | 2.52 | 1.48 | | 3.03 | 1.94 | | 2.11 | 2.06 | |
| Case report | 8.87 | 4.90 | | 0.95 | 0.00 | | 10.76 | 13.13 | | 8.23 | 8.23 | |
| Other | 18.72 | 5.95 | | 0.00 | 0.37 | | 16.48 | 16.41 | | 10.25 | 10.30 | |
| Main affiliation | | | | | | | | | | | | |
| Orthodontic | 64.39 | 76.78 | $P < .001$[b] | 67.51 | 73.06 | $P < .05$[b] | 55.44 | 74.41 | $P < .001$[b] | 59.90 | 74.87 | $P < .001$[b] |
| Nonorthodontic | 17.51 | 13.87 | | 19.56 | 21.22 | | 14.29 | 8.98 | | 16.08 | 12.72 | |
| Nonacademic | 18.10 | 9.33 | | 12.93 | 5.72 | | 30.27 | 16.61 | | 24.02 | 12.41 | |
| Origin | | | | | | | | | | | | |
| United States/ Canada | 38.87 | 25.32 | $P < .001$[b] | 3.47 | 2.76 | $P < .001$[b] | 55.64 | 37.84 | $P < .001$[b] | 41.15 | 27.55 | $P < .001$[b] |
| European Union | 26.41 | 9.68 | | 69.09 | 55.25 | | 19.61 | 20.03 | | 31.03 | 23.57 | |
| Non–European Union | 6.23 | 21.00 | | 6.94 | 15.10 | | 3.88 | 4.55 | | 5.03 | 11.40 | |
| Oceania/Pacific | 21.37 | 28.24 | | 14.20 | 13.81 | | 13.23 | 19.16 | | 15.22 | 20.85 | |
| Other | 7.12 | 15.75 | | 6.31 | 13.08 | | 7.64 | 18.42 | | 7.25 | 16.63 | |

[a] AO indicates *The Angle Orthodontist*; EJO, *European Journal of Orthodontics*; and AJODO, *American Journal of Orthodontics and Dentofacial Orthopedics*.

[b] Pearson chi-square test.

[c] Fisher exact test.

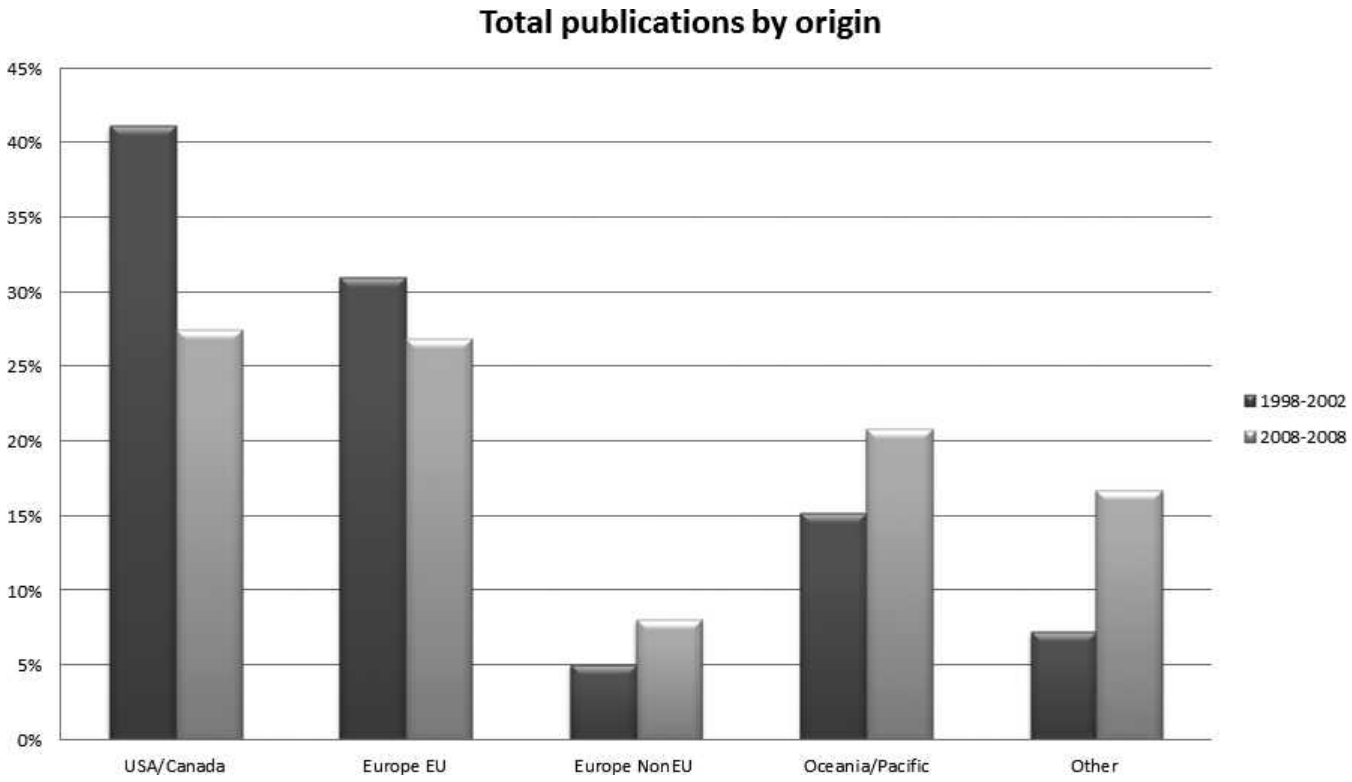


**Figure 1.** Total publications by origin for the two periods, indicating fewer articles from the United States/Canada and European Union countries, and more publications from non–European Union countries, from Pacific/Oceania, and other countries.

and maxillofacial surgery.[19–21] Also, an increasing number of studies on bibliometrics or citation analysis in orthodontics have been conducted.[5,7,22–25] This trend is not confined to dentistry, but also involves other medical disciplines such as dermatology,[26] general anesthesia,[27] urology,[28] neurosurgery,[29] plastic surgery,[30] and ophthalmology.[31]

The present study, however, includes a longitudinal set-up comparing three major orthodontic journals over a period of 10 years. Comparing the contribution from non– European Union countries, it seems that this group has almost doubled the number of papers in the three journals analyzed between the first and the second interval (122 to 233 articles). Tables 3 and 5 show that Turkey was the main contributor to this increase (7.40% of 11.06%). Articles from other countries were likewise increased (182 to 485 articles); Brazil mostly contributing to this gain (9.75% of 16.63%). On the other hand, fewer articles from the United States/Canada and European Union countries were published in all three journals compared with the previous period. These results are in accordance with the findings of a bibliometric study[16] on prosthodontic literature. That study also revealed an increasing number of authors and a trend of globalization of authorship.

In comparison with the first interval, academic orthodontic departments contributed to the publications at a higher extent, while nonacademic centers and nonorthodontic units contributed less. This might reflect the fact that specialty educational programs have enhanced their research programs because of an increased competitiveness in attracting research grants as a means of financial security, as well as employment of orthodontic faculty with substantial research background.[32]

The AO was the only journal showing a statistically significant increase in research articles from the first to the second interval. At the same time, the percentage of case reports decreased in the AO and increased in the AJODO. There is a trend for both AO and EJO to consist of research articles for the most part, while the AJODO regularly publishes case reports and other articles. Review articles are still rarely found in all three journals.

Apart from the results found in this study, the three journals also differ from other perspectives. The AJODO publishes 12 issues per year, whereas the AO and EJO publish only six. While the number of issues per journal remained unchanged, the AJODO published articles online only in the second period. This fact could partly explain the increase of journals

found in the AJODO from the first to the second period (892 to 1493) (Table 4). The online contents of the EJO and AJODO are only accessible for paying users or libraries. On the contrary, the access to the publications on the website of AO is free.

Mavropoulos and Kiliaridis[24] found that almost half of the publications find their way to printing in nonorthodontic journals, including biomedical periodicals with high-impact factor ratings. Therefore, a potential large source of information could have been missed by the selection of the three journals in the present study. In their analysis, they identified many high-quality studies of orthodontic interest that were not published in orthodontic journals. This might eventually be detrimental to the specialty because it dissociates the orthodontic journals from important information. Sun et al.[7] revealed that approximately 45% of the articles from 1990 to 1998 resided in five orthodontic journals, whereas the remaining were featured in approximately 66 other journals.

The results of this study and selection of journals do not pose a qualitative evaluation of the content of the journal. Also, it should be stressed that the analysis of the results does not imply that the scientific validity and wealth of information cannot be accessed in nonimpact factor journals. Because of the selection of only three journals (AO, AJODO, and EJO), some publication bias may be present. The differences shown between the three journals with respect to content characteristics may suggest that the profiles of journals not included in this analysis cannot be predicted. As a consequence, the interpretation of the present findings should be limited to the journals included.

Likewise, a limitation of this study is that during the second period, another journal (*Orthodontics & Craniofacial Orthopedics*) was included in the high-impact factor list of orthodontic periodicals, and this may impact the submission of more research to this journal. The analysis did not take such a development into account for reasons of comparability of evidence with the previous 5-year interval. In a recent study,[33] the 100 top-cited articles in orthodontics from 1975 to 2011 were retrieved from the same three journals as in the present study (AO, AJODO, and EJO). In the aforementioned study, the three journals *Australian Journal of Orthodontics*, *Korean Journal of Orthodontics*, and *Journal of Orofacial Orthopedics* were finally excluded, as there was no top-cited article published in any of them.

As there is evidence[34] that journals prefer to publish significant results, reviewing the orthodontic literature itself may bias the results of the present study. Moreover, a portion of orthodontic research is published in general dental periodicals, engineering journals, or basic science sources; the topics in these publications determine the target source as affiliations with dental, engineering, or biology faculty prevail. However, this information could not be assessed in this study.

## CONCLUSIONS

- The publications from 1998–2002 and 2008–2012 were significantly different in both amount and characteristics. In the second interval, the number of publications was almost double compared to the first. Fewer articles from the United States/Canada and European Union countries, but more publications from non–European Union countries, from Pacific/Oceania, and from other countries were found. All journals significantly published more articles from orthodontic departments and fewer from nonacademic sources.
- Today, there are still notable differences between the three journals AO, EJO, and AJODO concerning type and origin of articles.

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